NOTES ON THE ORANGERUMPED HONEYGUIDE *INDICATOR XANTHONOTUS* AND ITS ASSOCIATION WITH THE HIMALAYAN HONEY BEE *APIS LABORIOSA*[1]

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The orangerumped honeyguide *Indicator xanthonotus* and the Himalayan honey bee *Apis laboriosa* share geographic and altitudinal ranges. Confusion between the two large, open-nesting species of honey bees, *A. dorsata* and *A. laboriosa,* has obscured what is probably an exclusive association between *I. xanthonotus* and *A. laboriosa.* Environmental degradation and predation by honey hunters may explain the apparent scarcity of both *I. xanthonotus* and *A. laboriosa* in the western Himalaya. Observations of honeyguide behaviour in Nepal, coupled with published reports, suggest that *I. xanthonotus* males may establish territories at the time of natural migrations by *laboriosa* colonies and that such territories are held year-round. There is a need for additional data to define more clearly the association between *I. xanthonotus* and *A. laboriosa.*

INTRODUCTION

Until quite recently, the orangerumped honeyguide *Indicator xanthonotus* remained largely unknown. Specimens of the birds had been collected as early as 1842, but next to nothing was known of their biology or behaviour until the studies of Cronin and Sherman (1976) in Nepal and Hussain and Ali (1983) in Bhutan. A parallel situation exists with respect to the Himalayan honey bee *Apis laboriosa.* Although this largest of all honey bees was first described in 1871 (Moore *et al.*) from specimens collected in Yunnan Province, China, almost nothing was known of its natural history until the recent studies conducted by Underwood (1986, 1990a) in Nepal.

A recent study of *A. laboriosa* in western Nepal led to an opportunity to make some observations of the association between these bees and *I. xanthonotus.* Although the study focused on the bees and the data on *xanthonotus* take the form of casual observations, I hope that the thoughts presented here may contribute to our knowledge of these two fascinating creatures.

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TAXONOMY

Honeyguides: Ornithologists are in general agreement that the orangerumped honeyguide is a single species, *Indicator xanthonotus,* described in 1842 by Blyth from a specimen collected in Darjeeling. Three subspecies have been described from the eastern (*radcliffi*), central (*xanthonotus*), and western (*fulvus*) parts of the honeyguide's range, but a paucity of specimens leaves the validities of these designations in some question (Ali and Ripley 1970).

With its distinctive markings, especially the flashing orange rump of a bird in flight, *I. xanthonotus* is unlikely to be confused with other Himalayan birds (see Ali and Ripley 1970, Fleming *et al.* 1976). Sightings coupled with behavioural observations of cerophagy (wax-eating) should dispel any lingering doubts as to the identification of the bird involved.

Honey bees: Until quite recently, most scientists regarded *Apis laboriosa* Smith as a high-altitude race of *A. dorsata,* also known as the giant honey bee or rock bee. A growing body of evidence suggests that the two are, in fact, separate species (Sakagami *et al.* 1980, McEvoy and Underwood 1988, Underwood 1990b) and that valuable biological information may be lost by confusing them.

From a distance, colonies of *A. dorsata* and

A. laboriosa look very similar. Both species build large (up to about 2 m across), single-comb nests in the open, enclosing the comb within a living blanket of bees several layers thick. On closer inspection, however, obvious differences between the two become apparent. The most striking differences involve colour patterns and size. Workers of *dorsata* are mostly brown, with black stripes on the dorsal surface of the abdomen, have black and brown thoracic hairs, and have an unengorged body mass of about 115 mg. Workers of *laboriosa* are entirely black (though they appear to have white stripes if the abdomen is distended), with long, tawny thoracic hairs and a mass of about 165 mg (Sakagami *et al.* 1980, Dyer and Seeley 1987, Underwood 1990a).

Differences in the size of workers are reflective of differences in cell size in combs of the two species. Combs of *A. dorsata* have cells that average less than 5.5 mm between parallel sides, while those of *laboriosa* usually average greater than 6 mm (Underwood 1986). Cell measurements can be useful in determining the bee species when no adults are available, but when an undeformed comb can be obtained (e.g., at abandoned nest sites).

Geographic Distributions and Ecological Notes

Honeyguides: Nearly all the reported sightings of *I. xanthonotus* have been from high-altitude locations in Bhutan, Burma, China, India and Nepal. Specimens have been collected from Hazara, Pakistan in the west (Hume 1870) to Burma in the east (Smythies 1949). Reports from the western Himalaya have been rare; most of our knowledge of *xanthonotus* is based on studies conducted in the central and eastern parts of the birds' range (Cronin and Sherman 1977, Hussain and Ali 1983).

Honeyguides are most often seen in close proximity to the abandoned combs of cliff-dwelling honey bees. Fleming *et al.* (1976) reported a honeyguide at 610 m in western Nepal, but other reports have been from altitudes of 1200 to 3500 m. Ripley (1950) suggested some altitudinal migration by *xanthonotus* and is supported by Hussain and Ali (1983).

Honey bees: The known range of *A. laboriosa* extends from western Nepal through Bhutan and the Assam Himalaya to Yunnan Province in China and includes part of Tibet (Sakagami *et al.* 1980). I am aware of anecdotal accounts of cliff-dwelling honey bees at high altitudes (>2000 m) in Kashmir. At least two published reports (Moorcroft and Trebeck 1841, Hussain 1978) seem to refer to *laboriosa* in Garhwal, but those accounts do not specifically identify the bees involved.

Morphological differences between *A. dorsata* and *A. laboriosa* workers probably reflect adaptations to the different environments in which colonies live; nest habitat may be an important clue in distinguishing between the two species in the field. *Apis dorsata* colonies seem to be confined to tropical and subtropical parts of Asia, while *laboriosa* nests in regions that experience a temperate to subalpine climate. In western Nepal, *laboriosa* colonies nest at altitudes of 1200 to 3500 m and migrate seasonally, avoiding the highest altitudes for all but a few months in summer (Underwood 1990a). *Apis dorsata* colonies are rarely, if ever, found above 1200 m in Nepal (pers. obs.). Reports of *dorsata* colonies at high altitudes (above the subtropical zone) in Nepal and elsewhere (e.g. Cronin and Sherman 1976, Hussain and Ali 1983) may be attributed to confusion between the two species of bees.

Study Area and Timing

Observations reported below were made between December 1987 and February 1989 in the valley of the Modi Khola river in west-central Nepal. The study involved nesting sites of *Apis laboriosa* on several cliffs at altitudes between 1250 and 3500 m (see Underwood 1990a). Observations of the association between *I. xanthonotus* and *A. laboriosa* were incidental

to the principal objectives of the study. One of those objectives was to determine the seasonal cycle of occupation by *laboriosa* colonies of several cliff sites within the Modi Khola valley. Towards that end, some observation periods were very brief: simple scans of a cliff to determine the presence or absence of bees. At other times, more extensive observations, some lasting most of a day, were carried out. Sightings of *I. xanthonotus* usually coincided with periods of extended observation of a given cliff site and failure to observe honeyguides at other times need not imply that they were not present. Place names given here are those of the cliffs themselves or of villages or other convenient reference points near the cliffs.

Observations

Landruk (1250 m): The cliff site at Landruk was observed for extended periods only during the time of a honey harvest in May 1988. 13 colonies of *A. laboriosa* had been observed on the cliff in April, but three had abandoned their combs prior to the harvest, which began on 17 May. On that date, a single *I. xanthonotus* was seen eating bee larvae or pupae that were probably diseased (see Underwood 1990a) and had been abandoned in one of the combs. Later that day, the honeyguide was observed eating the light-coloured wax at the top of the nest.

Kuli (1710 m): The Kuli cliff was occupied by *A. laboriosa* colonies from February to November 1988. At least one *I. xanthonotus* was seen at Kuli at various times from January to May 1988 and again from November 1988 to February 1989. The lack of sightings during summer 1988 was due to the fact that I was occupied elsewhere (at higher altitudes).

Dovan (2680 m): In December 1987, the cliff at Dovan was scaled and anchors were bolted to the rock so that an observation platform could be placed near *A. laboriosa* colonies the following summer. There were no colonies of bees at the site in December, but several abandoned combs remained from the previous summer. Placement of the anchors required six days and on each day, at least one *I. xanthonotus,* presumably the resident male, was seen nearby. On one occasion, a second bird appeared and was engaged briefly in an aerial chase by the first.

In 1988, colonies of *A. laboriosa* nested at Dovan from early June until early October. the cliff was observed extensively from July through October and at least one *I. xanthonatus* was present throughout that time. The bird had a favourite perch beneath a small overhang on the cliff and was often seen pecking at abandoned combs, but it never disturbed active *laboriosa* colonies and was never seen capturing bees. On 3 October, one of the last two *laboriosa* colonies remaining at Dovan abandoned its nest for the fall migration to lower altitudes (Underwood 1990a). The colony took off at 1023 hrs and within 30 seconds, the resident *I. xanthonotus* landed on the newly exposed comb and began to feed on that portion where the pollen was stored (near the top between the honey storage comb and the brood comb). The honeyguide was seemingly undisturbed by my presence, even though I was seated on the observation platform, less than 4 m away. Over the next hour, the bird made several trips between the comb and his perch. At 1125 hrs a second *I. xanthonotus* landed on the comb, prompting the first to leave his perch and chase the intruder away.

Bagar (3360 m): Bagar was occupied by *A. laboriosa* colonies from June to early October 1988, but was kept under extensive observation only for several days in late September. No *I. xanthonotus* was ever seen at Bagar and abandoned *laboriosa* combs there showed no damage that might be attributed to feeding by honeyguides. Indeed, the old combs at *Bagar* seemed to represent the accumulation of at least three years (exposed combs become progressively darker with age), to the extent that little nesting space remained.

Despite the fact that well over 100 hours

were spent bird-watching in the forests surrounding the various cliff sites, no *I. xanthonotus* was ever observed more than 100 m from a cliff on which old combs of *A. laboriosa* were present.

Discussion

Ripley (1950) suggested that *I. xanthonotus* might undertake altitudinal migrations, perhaps in the manner of the open-nesting honey bees on whose combs the honeyguides feed. Cronin and Sherman (1976), on the other hand, found that male *I. xanthonotus* defend their territories year-round and thereby gain access not only to a valuable resource (wax) but also to females that come to feed on that resource. In Bhutan, Hussain and Ali (1983) found the concentration of honeyguides around cliff bee sites to be especially heavy (20 or more at a single cliff) in October-November and suggested that there may indeed be some altitudinal migration on the part of the birds.

The observations reported here do little to clarify whether or not some honeyguides practice migration. Certainly the presence of *I. xanthonotus* at Dovan in both summer and winter suggests that particular territories are occupied year-round by resident males, but observations of the behaviour of satellite males were very limited. The number of honeyguides observed by Hussain and Ali (1983) in Bhutan was much greater than in the present study. Perhaps at high population densities, the behaviour of the birds may be somewhat different than at lower densities.

Hussain and Ali (1983) observed the greatest concentration of honeyguides at a 1900 m site in October-November and reported that at that time, there seemed to be the least amount of wax (abandoned combs) available. In Nepal, *A. laboriosa* colonies nesting on cliffs at altitudes below about 2000 m abandon their combs and move into the forest in late November (Underwood 1990a). If the behaviour of the bees in Bhutan is similar, a bonanza of combs would become available to *I. xanthonotus* at that time. Could it be that the honeyguides observed by Hussain and Ali were positioning themselves to take advantage of such a bonanza? Perhaps the ideal time to establish a territory is immediately after bees abandon a comb. That might explain the rapidity with which the resident male at Dovan 'staked his claim' after the migration of a *laboriosa* colony in early October. Several other abandoned combs had been available for some weeks; the bird's actions cannot be attributed to an urgent need for wax.

The coincidence between the altitudinal and geographic ranges of both *I. xanthonotus* and *A. laboriosa* may be an indication that the life history of the former is somehow tied to that of the latter and not to that of the other large, open-nesting honey bee, *A. dorsata*. Except for a single sighting at 610 m (Fleming *et al.* 1976; that bird may have been a stray?), all reports of *I. xanthonotus* fall within the 1200-3500 m nesting range of *A. laboriosa*.

The reported eastern limits of the ranges of both *I. xanthonotus* and *A. laboriosa* are nearly identical (Burma and Yunnan China), while reports from the western Himalayas are rare for both species. In contrast, the geographic range of *A. dorsata* extends far beyond the Himalayan region and includes nearly all of tropical and subtropical South and South-east Asia (Sakagami *et al.* 1980).

The close association between *I. xanthonotus* and *A. laboriosa* does not necessarily imply that the wax produced by *laboriosa* has any special characteristics (over that of wax produced by *A. dorsata*) essential to the honeyguides, though that is a possibility. If *I. xanthonotus* is a brood parasite, as are a number of the African honeyguides (Friedmann 1955), perhaps it is restricted to the habitat of its host species. That habitat may, for whatever reasons, coincide with the range of *laboriosa*.

In Nepal, and possibly elsewhere, environmental degradation and repeated honey harvests have apparently contributed to a decline in

populations of *A. laboriosa* (Valli and Summers 1988). Because of the close association between *A. laboriosa* and *I. xanthonotus* and the birds' apparent need for wax, a decline in the bee population may lead to a decline in the honeyguide population as well. That could explain the scarcity of both *A. laboriosa* and *I. xanthonotus* in the western Himalaya and the relative abundance of honeyguides in Bhutan, where harvests of cliff bee nests have been banned (Hussain and Ali 1983).

There is a need for additional data to clarify the relationship between *I. xanthonotus* and *A. laboriosa* and to determine if *xanthonotus* is ever associated with *A. dorsata*. Anyone interested in observing the orangerumped honeyguide would do well to seek out the nesting sites of the honey bees first. Certainly the chances of observing *I. xanthonotus* are much greater at those sites than elsewhere. Since both *dorsata* and *laboriosa* tend to nest at the same sites year after year and since honey from those nests is a precious commodity throughout much of the bees' range, people living near the nesting sites are usually well aware of their location. Local inquiries about bees can be a useful tool in the search for *I. xanthonotus*, even though many people may be unaware of the birds themselves. Efforts must be made to identify positively the species of bee involved and it is important that data, including altitude, about the location of any sightings be recorded. Clarification of the relationship between *I. xanthonotus* and *A. laboriosa* might facilitate efforts to protect the orangerumped honeyguide, as suggested by Hussain and Ali (1983).

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